



U.S. Department  
of Transportation

**National Highway  
Traffic Safety  
Administration**



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DOT HS 812 817

October 2019

# **Special Crash Investigations Remote Air Bag Non-Deployment Crash Investigation Vehicle: 2016 Ram 1500 Location: Washington Crash Date: March 2017**

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### Suggested APA Format Citation:

Dynamic Science, Inc. (2019, October). *Special Crash Investigations: Remote Air Bag Non-Deployment Crash Investigation; Vehicle: 2016 Ram 1500; Location: Washington; Crash Date: March 2017* (Report No. DOT HS 812 817). Washington, DC: National Highway Traffic Safety Administration.

## Technical Report Documentation Page

1. Report No. DOT HS 812 817	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Special Crash Investigations: Remote Air Bag Non-Deployment Crash Investigation Vehicle: 2016 Ram 1500 Location: Washington Crash Date: March 2017		5. Report Date October 2019	
		6. Performing Organization Code	
7. Author Dynamic Science, Inc.		8. Performing Organization Report No. Case No. DS17012	
9. Performing Organization Name and Address Dynamic Science, Inc. 299 West Cerritos Avenue Anaheim, CA 92805		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTNH22-12-C00271	
12. Sponsoring Agency Name and Address National Highway Traffic Safety Administration 1200 New Jersey Avenue SE Washington, DC 20590		13. Type of Report and Period Covered Technical Report Crash Date: March 2017	
		14. Sponsoring Agency Code	
15. Supplementary Notes This report documents the remote investigation of the non-deployment of air bags and the injuries sustained by the driver of a 2016 Ram 1500 involved in a head-on crash with a 2016 Toyota Camry.  Each crash represents a unique sequence of events, and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicles or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team.			
16. Abstract This two-vehicle crash occurred in March 2017 on a two-lane road in Washington. The Ram was traveling westbound at a driver-reported speed of approximately 51 km/h (32 mph). A 2016 Toyota Camry was traveling eastbound. The Toyota crossed the double-yellow center line and struck the front plane of the Ram head-on. According to the driver and images of the vehicle interior, there were no air bag deployments (Figure 2). The driver of the Ram contacted the steering wheel with his chest and right arm, causing multiple contusions. The driver also reported he sustained a cervical strain and was still undergoing treatment 4 months after the crash. The vehicle had been declared a total loss by the insurance company shortly after the crash. The vehicle was then sold to a second party and transported to Missouri. SCI contacted the second party and learned that the vehicle was sold to a third party. SCI contacted the third party and learned that the vehicle had been repaired and was currently in use. Permission to inspect the vehicle was requested but not obtained. The event data recorder (EDR) data for this crash couldn't be obtained. Based on the impact severity and configuration it would be expected that the driver's frontal air bag would deploy during this crash.			
17. Key Words air bag, non-deployment		18. Distribution Statement Document is available to the public from the National Technical Information Service, <a href="http://www.ntis.gov">www.ntis.gov</a> .	
19 Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21 No. of Pages 12	22. Price

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**Special Crash Investigations**  
**Remote Air Bag Non-Deployment Crash Investigation**  
**Office of Defects Investigation (ODI)**  
**Case No. DS17012**  
**Vehicle: 2016 RAM 1500**  
**Location: Washington**  
**Crash Date: March 2017**

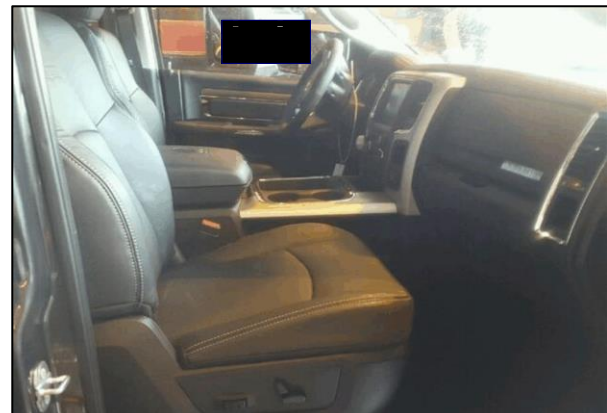
**BACKGROUND**

This report documents the remote investigation of the non-deployment of air bags and the injuries sustained by the driver of a 2016 Ram 1500 involved in a head-on crash with a 2016 Toyota Camry (**Figure 1**). This investigation was initiated by the Office of Defects Investigation (ODI) in response to a driver notification. The Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration assigned the case to Dynamic Science, Inc. in July 2017. The vehicle had been declared a total loss by the insurance company shortly after the crash. The vehicle was then sold to a second party and transported to Missouri. SCI contacted the second party and learned that the vehicle was sold to a third party. SCI contacted the third party and learned that the vehicle had been repaired and was currently in use. Permission to inspect the vehicle was requested but not obtained.



**Figure 1.** 2016 Ram 1500, frontal damage (salvage facility photo).

This two-vehicle crash occurred in March 2017 on a two-lane road in Washington. The Ram was traveling westbound at a driver-reported speed of approximately 51 km/h (32 mph). A 2016 Toyota Camry was traveling eastbound. The Toyota crossed the double- yellow center line and struck the front plane of the Ram head-on. Based on the interview with the driver, and images obtained of the vehicle interior, there were no air bag deployments (**Figure 2**). The driver of the Ram contacted the steering wheel with his chest and right arm, causing multiple contusions. The driver also reported he sustained a cervical strain and was still undergoing treatment 4 months after the crash. Based on the impact severity and configuration it would be expected that the driver's frontal air bag would deploy during this crash, as discussed on the following page.



**Figure 2.** 2016 Ram 1500, interior (salvage facility photo).

## SUMMARY

### *Crash Site*

The crash site was in the westbound lanes of an undivided State route (**Figure 3**). Westbound traffic was separated from eastbound traffic by a double yellow line. The westbound portion of the roadway was configured with two through lanes that were separated by a dashed white line. The roadway was generally straight in the westbound direction. The eastbound portion approaching the crash site was curved to the right and configured with a single through lane. The asphalt roadway was wet. The posted speed limit was 56 km/h (35 mph) in both directions. The weather at the nearest reporting station was 7 °C (46 °F), 86 percent humidity, 16 km (10 miles) visibility, overcast and the winds were out of the southeast at 35.2 km/h (21.9 mph). A crash diagram is attached at the end of this technical report.



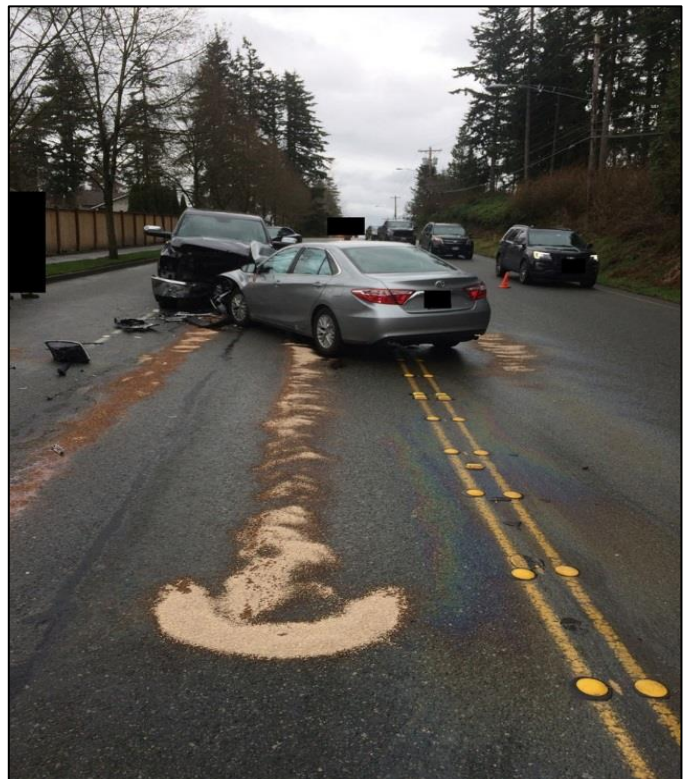
**Figure 3.** Westbound approach (Google Street View).

### *Pre-Crash*

The Ram was traveling westbound at a driver-reported speed of approximately 51 km/h (32 mph). The Toyota was traveling eastbound and was negotiating a right curve. The driver of the Toyota indicated that he was distracted by a noise in the back seat and took his eyes off the roadway. The Toyota crossed the double-yellow center line and entered the westbound travel lane. The driver of the Ram braked.

### *Crash*

The front plane of the Toyota struck the front left plane of the Ram (Event 1). The collision deformation classification (CDC)-only algorithm of the WinSMASH program using an estimated crush profile for the Ram generated a total delta-V of 18 km/h (11 mph) for the Ram. The longitudinal and lateral components were -17 km/h (-10 mph) and 6 km/h (4 mph), respectively. The vehicles were not inspected and the



**Figure 4.** Final rest, looking east (police photo).

results were low and borderline. There were no air bag deployments. The program calculated a total delta-V of 29 km/h (18 mph) for the Toyota. The longitudinal and lateral components were -29 km/h (-18 mph) and 5 km/h (3 mph), respectively. The Ram rotated slightly clockwise and came to rest in its original travel lane. The Toyota rotated slightly counterclockwise and came to rest partially in the westbound travel lane (**Figure 4**).

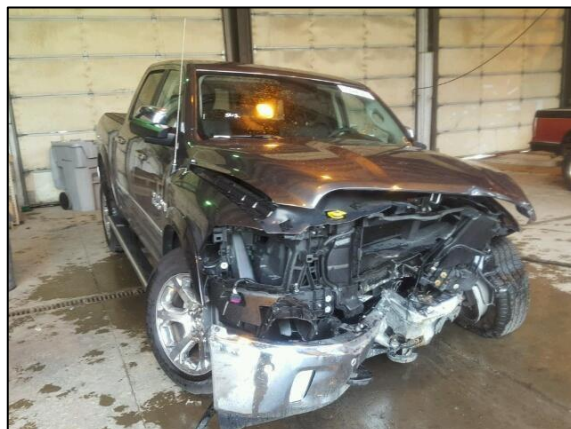
### ***Post-Crash***

The driver of the Ram sustained police-reported “B” non-incapacitating injuries. He was able to exit the vehicle under his own power and was not treated on scene. He later sought treatment from his private physician. The driver of the Toyota sustained police-reported “B” non-incapacitating injuries. He was able to exit the vehicle under his own power and was not treated on scene. He claimed injuries to his chest and hands. The front right passenger sustained police-reported “B” non-incapacitating injuries. He indicated that his right thumb was injured.

## **2016 RAM 1500**

### ***Description***

The 2016 Ram 1500 was a 4-door crew cab pickup. The vehicle was identified by the Vehicle Identification Number (VIN) 1C6RR7NT7GSxxxxxx. The vehicle mileage was 8,838 km (5,492 miles). The vehicle was equipped with a 5.7-liter, 8-cylinder, gasoline engine, automatic transmission, and 4-wheel drive. The Ram was configured with seating for five occupants. The front row was equipped with fabric-covered bucket seats with adjustable head restraints.



**Figure 5.** 2016 Ram 1500 pickup, frontal damage (salvage facility photo).

The Ram was purchased new by the involved vehicle driver and had not been involved in any previous crashes according to the driver and a CARFAX report. The vehicle was declared a total loss by the insurance company shortly after the crash. The vehicle was then sold to a second party and transported to Missouri. SCI contacted the second party and learned that the vehicle was sold to a third party. SCI contacted the third party and learned that the vehicle had been repaired and was currently in use. A rebuilt title was issued in May 2017, by the Washington DMV. A second rebuilt title was issued in July 2017, by the Missouri DMV. SCI was unable to obtain any EDR data.

### ***Exterior Damage***

The Ram sustained moderate frontal plane damage from the impact with the Toyota (**Figure 5**). The direct damage began at the left bumper corner and extended approximately half-way across the front bumper to the left. The Field L extended from bumper corner to bumper corner. The left front tire was debeaded and restricted. The maximum crush was located at the left bumper corner and estimated to be 50 cm (19.6 in). The CDC was 11FYEW2.

### ***NHTSA Recalls and Investigations***

There were two recalls associated with the VIN for this vehicle at the time of this report. The recalls were related to engine control and the tailgate. The recall database was last queried in June 2019.

### ***Event Data Recorder***

The Ram was equipped with an occupant restraint controller (ORC) that had EDR capability to store deployment and non-deployment events. No EDR data was available for this vehicle because the vehicle had been repaired and was not available for inspection to the SCI investigator. The investigating police agency did not obtain EDR data in their investigation.

### ***Interior Damage***

Based on a limited number of interior images there does not appear to be any significant interior damage.

### ***Manual Restraint Systems***

The front row was equipped with driver and front right passenger lap and shoulder seat belts. The driver's belt was equipped with continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and an adjustable upper anchor. It is unknown if the seat belt's retractor pretensioner actuated. According to the driver, he was wearing the seat belt during the crash.

### ***Supplemental Restraint Systems***

The supplemental restraint system included an ORC, dual-stage frontal air bags for the driver and front right passenger positions, seat-mounted side-impact air bags for the front row seats, front row seat belt retractor pretensioners, and combination side-impact, roll-sensing inflatable curtain (IC) air bags for the front and second row seats. There were no air bag deployments.

### ***Air Bag Non-Deployment Discussion***

The front air bag system has multistage driver and front passenger air bags. This system provides output appropriate to the severity and type of collision as determined by the ORC. The system is not designed to deploy in all frontal collisions, including impacts with pole, truck overrides, etc. In this crash, however, the impact severity was of sufficient magnitude, impact configuration was typical, and it would be expected that the driver's frontal air bag would deploy.

## **2016 RAM 1500 OCCUPANT**

### ***Driver Demographics***

Age/Sex:	71 years/male
Height:	178 cm (70 in)
Weight:	82 kg (180 lbs)
Eyewear:	Eyeglasses
Seat type:	Bucket
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder used



Usage source: Driver interview  
 Air bags: Steering wheel mounted frontal, seat-mounted side, and IC air bags, not deployed  
 Alcohol/drug data: None  
 Egress from vehicle: Exited under own power  
 Transport from scene: None  
 Type of medical treatment: Treated by private physician later

***Driver Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Component (IPC)</b>	<b>IPC Confidence Level</b>
1	Contusion, left upper chest	410402.1	Seat belt webbing	Certain
2	Contusion, center chest	410402.1	Steering wheel hub	Probable
3 4	Contusion, right inner forearm and elbow	710402.1 710402.1	Steering wheel rim	Certain
5	Cervical strain	640278.1	Hyper flexion, seat belt webbing	Probable

*Source: Interviewee*

***Driver Kinematics***

The 71-year-old male driver was seated in an upright position and was wearing the manual lap and shoulder belt. Both hands were on the steering wheel and his right foot was on the accelerator. He saw the Toyota cross into his lane and braked. At impact with the Toyota he was displaced forward, loading the shoulder belt with his left chest and contacting the steering wheel hub with his center chest. His right hand came off the steering wheel rim and he contacted the steering wheel rim with the inner portion of his right forearm and elbow. He exited the vehicle under his own power and later sought treatment from his private physician. He also underwent treatment under the care of a chiropractor.

**2016 TOYOTA CAMRY**

***Description***

The 2016 Toyota Camry was a 4-door sedan. The vehicle was identified by the VIN 4T1BF1FK0GUxxxxxx. The vehicle was equipped with a 2.5-liter, 4-cylinder, gasoline engine and front-wheel drive.

### ***Exterior Damage***

The Toyota sustained moderate front plane damage from the impact with the front of the Ram (**Figure 6**). Both frontal air bags deployed. The vehicle was not inspected and the EDR was not available for imaging. The vehicle sustained moderate longitudinal crash along the entire front plane. The hood was displaced rearward and the left front tire was restricted. The estimate CDC was 12FDEW1. The Toyota was towed from the scene due to damage.

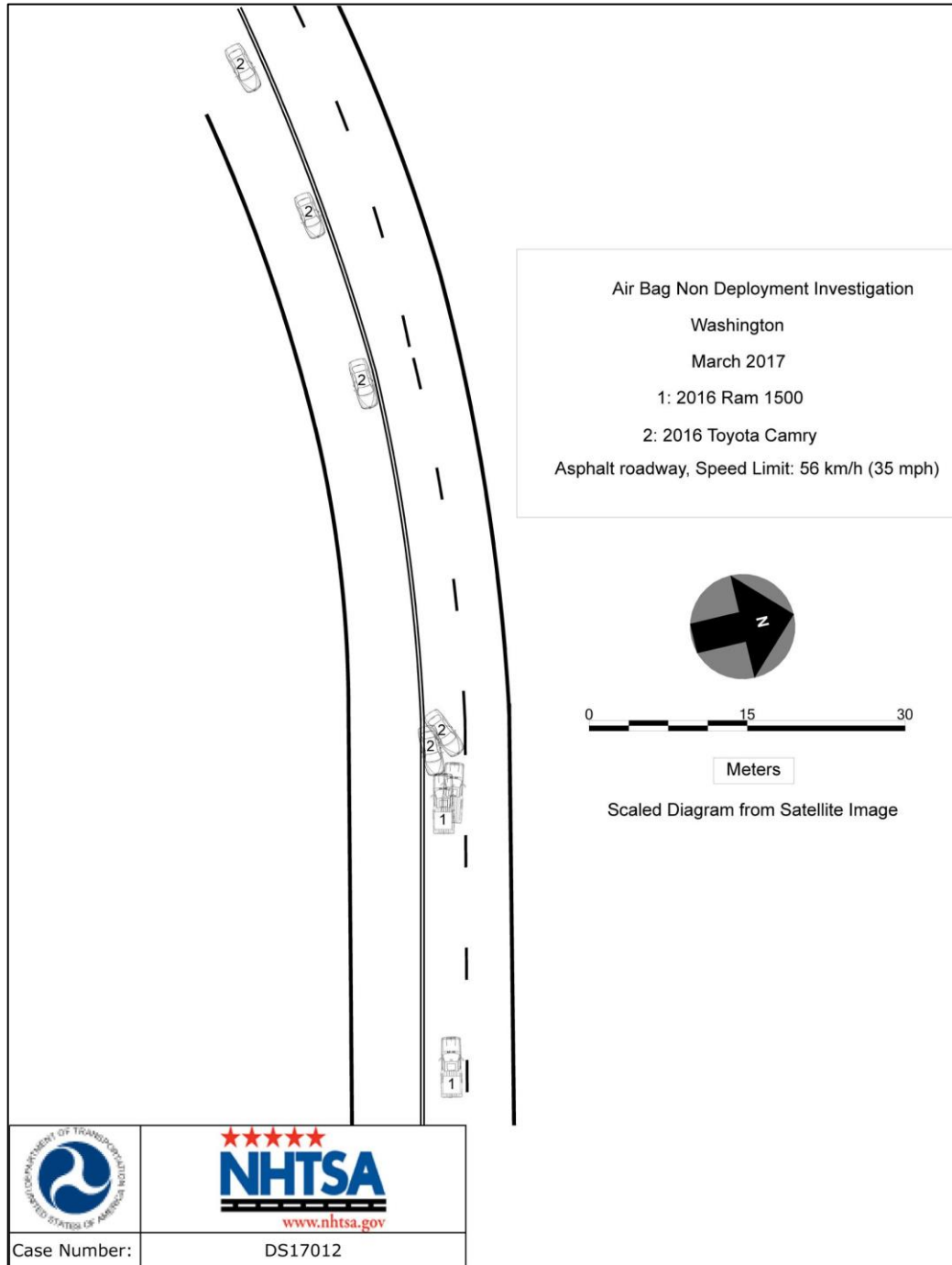
### ***Occupants***

The Toyota was being driven by a 42-year-old male who was belted, according to the police. The front right seat was occupied by a 48-year-old male who was belted, according to the police. The driver of the Toyota sustained police-reported “B” non-incapacitating injuries. He was able to exit the vehicle under his own power and was not treated on scene. He claimed injuries to his chest and hands. The front right passenger sustained police-reported “B” non-incapacitating injuries. He indicated that his right thumb was injured and he was treated at the scene and released.



**Figure 6.** 2016 Toyota Camry, front damage (police photo).

# CRASH DIAGRAM



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